Noteworthy anatomical and physiological researches.

The function of the secondary tissues in arborescent monocotyledons.[1]

The secondary growth in the aerial and terrestrial stems of the arborescent monocotyledons has already been studied by various authors, as for instance: Karsten, Millardet, Mirbel, Nägeli, Röseler and Wossidlo[2]. These investigations have been mostly restricted to the mere origin and development of the secondary meristem, while the study of the function of this tissue has been rather neglected.

The few authors, in whose works mention has been made of function, agree, however, in considering the secondary tissue as giving rise to a supporting apparatus for the stem, which often attains a considerable size in the Liliaceæ, for instance, *Dracæna* and *Cordyline*.

The structure of monocotyledons in which a secondary growth takes place exhibits two characteristic cases: the cells of the secondary tissues may become lignified as in *Dracæna*, *Cordyline* and *Lomatophyllum*, or their membranes may remain thin. There is no doubt that the first case shows a function of support, while in the other case an entirely different and highly important function is attributed to this thin-walled parenchyma. In *Cohnia flabelliformis*, for instance, the rhizome consists almost entirely of unlignified secondary parenchyma. These cells contain a considerable quantity of a fatty oil, which constitutes an important nutritive deposit especially for the development of adventitious buds. It is otherwise rare to find such deposits of fatty oils in the rhizomes.

A similar thin-walled parenchyma of secondary origin was also observed in *Yucca gloriosa*, especially in the rhizome; the cell-content was in this case a kind of sugar. *Dioscorea sativa* shows the presence of broad layers of secondary tissues, which form the principal element of the rhizome, as described by De Bary[3] as characteristic of other Dioscoreaceæ. The cells contained here large deposits of starch.

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[1] De Cordemoy, Sur le rôle des tissus secondaires à réserves des monocotylédones arborescentes (Comptes Rendus **117:** 132. 1893).

[2] For citations see the original paper.

[3] De Bary, Vergleichende Anatomie der Vegetationsorgane der Phanerogamen und Farne 640. Leipzig, 1877.

The secondary mestome bundles, which have originated from the secondary parenchyma, serve naturally as carriers of such substances as are useful to the plant. This is very conspicuous in *Dioscorea*, where starch grains form heavy masses around the mestome bundles; this starch becomes transformed, however, upon the renewed growth in the spring. At this time it takes a reddish-violet color with iodine, and the grains near the mestome bundles have decreased in size and look as if they were partly digested. THEO. HOLM.

The role of the pericycle in the root of Dracæna marginata.[4]

The roots in certain monocotyledons show an increase in diameter, a fact that has been observed in *Aletris fragrans*, and in some species of *Dracæna*, e. g., *D. marginata*, *D. reflexa*, *D. fruticosa*, *D. Draco* and *D. rubra*. It has been demonstrated in most cases that the secondary parenchyma, to which this increase in diameter is due, is of a pericyclic origin. The cells of the pericycle divide tangentially and give rise to a secondary tissue with centrifugal development; some of these cells begin, thereupon, to divide in various directions and produce procambial strings, which soon become differentiated into a corresponding number of secondary mestome bundles. The central cylinder, therefore, is the structure which undergoes an increase in diameter.

Some cases have been recorded, however, where similar secondary formations were not of pericyclic origin, but developed in the bark. This fact was observed in *Dracæna reflexa* and *D. marginata* by Morot.[5] The pericycle had in these cases, nevertheless, preserved a certain activity, showing a few divisions of its cells.

Some analogous observations have been made by the author, who has studied the structure of the roots of *Dracæna marginata*. All the roots showed the presence of secondary formations in the bark itself. The pericycle had to a certain extent been multiplied, and had here a true mechanical function, not previously noticed. A transverse section of one of these roots, in which there is not yet any sign of secondary formations, shows an endodermis, the cell walls of which are

[4] DE CORDEMOY, Du rôle du péricycle dans la racine du *Dracæna marginata*. Bull. de la soc. bot. de France, **40:** — 1893.

[5] LOUIS MOROT, Recherches sur le péricycle. Ann. d. sc. nat. Bot VI. **20:** 217. 1885.